One dimensional model for the prediction of residence time distribution granulation in a twin-screw granulator

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Twin-screw granulation is considered as a promising continuous alternative for traditional batch wet granulation processes. It allows a large volume production from different formulations with a short residence time. The twin-screw granulator (TSG) is composed of both transport and kneading element modules. The extent of different rate processes such as wetting, growth and breakage involved in granulation is greatly governed by the residence time distribution within each module where individual rate processes dominate over others. Currently, visual observations and experimental data are used to determine the residence time distributions (RTD). In this study, a dynamic transport model was developed based on classical chemical engineering methods. The simulation data and the experimental residence times are compared based on the solid feed rate, the screw rotation speed and the variation in type of screw modules. The result allows validating the transport model and predicting RTD which can be later coupled with a population balance model in order to predict more realistic granulation yields in a TSG.